

The Dynamics of Plant Nutation

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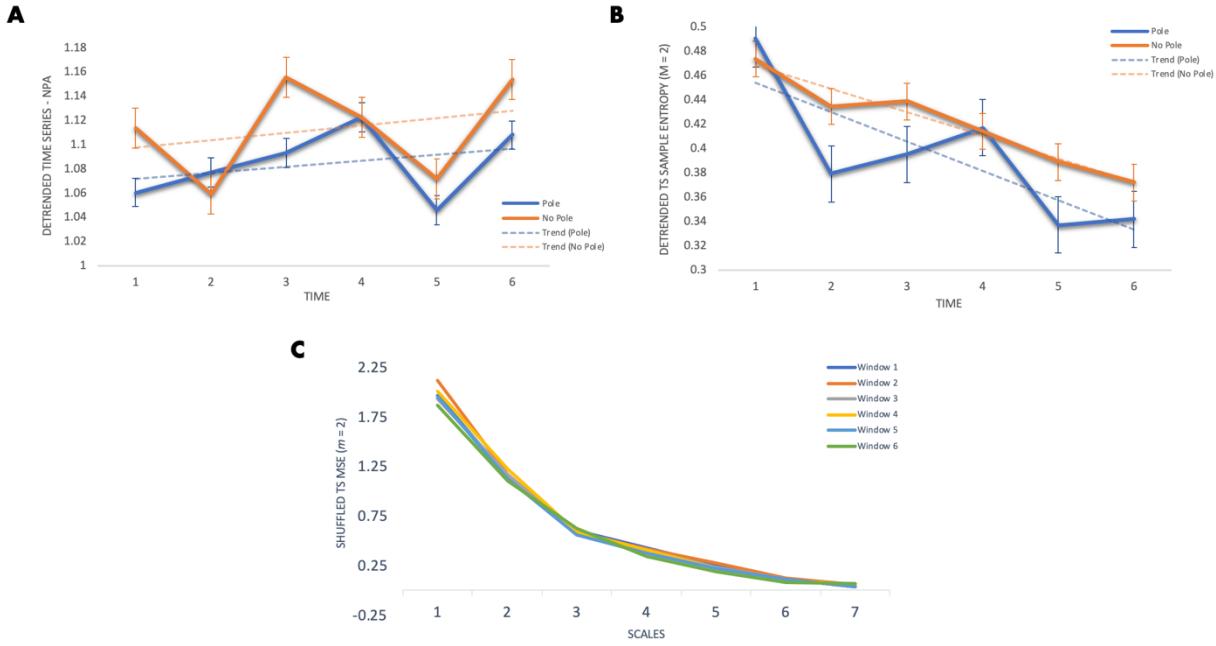
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- Supplementary Figure F1
- Supplementary Data D1 – Dynamical and Statistical Analyses (separate document ‘Supplementary Dataset D1 – Dynamical and Statistical Analyses.xlsx’)
- Supplementary Data D2 – Statistical Models
- Supplementary Video V1 – Pair 2 Pole Condition (‘Supplementary Video V1.mov’)**
- Supplementary Video V2 – Pair 2 No Pole Condition (‘Supplementary Video V2.mov’)**

**IMPORTANT: Better quality .AVI videos are available upon request.



Supplementary Figure 1. **(A)** NPA Analysis of detrended time series. Average values of NPA per windows 1 to 6 including standard errors. Solid blue line plots average NPA values for plants in pole condition and dashed blue line plots its linear trend. Solid orange line plots mean NPA values for plants in no-pole condition and dashed orange line plots its linear trend. The average NPA values and their trends for both conditions are almost indistinguishable from the produced by the original data (see Figure 3A). **(B)** SampEn Analysis of detrended time series. Average SampEn values per windows 1 to 6 and standard errors for $m = 2$, $r = .25$. Solid blue line plots average SampEn values for plants in pole condition and dashed blue line plots its linear trend. Solid orange line plots average SampEn values for plants in no-pole condition and dashed orange line plots its linear trend. The average SampEn values and their trends for both conditions are almost indistinguishable from the produced by the original data (see Figure 3B). **(C)** EMD-based MSE ($m = 2$, $r = .25$) for the surrogate shuffled time series of the pole condition including all windows and scales. The effect observed in the EMD-based MSE ($m = 2$, $r = .25$) for the original time series of the pole condition disappears (see Figure 4B-left).

Supplementary Data D2 – Statistical Models

Software Package

To analyze the data software package R studio, version 3.6.3, was used.

Packages used in R Studio

Package 'lme4' (Linear Mixed Effects Models)

Full Statistical Results

Normalized Peak Acceleration (NPA)

- Deviance comparison (-2 Log Likelihood; -2LL hereafter) between the full model (includes 2-ways interactions; NPA.F) and the reduced model (no interactions; NPA.R):

Data: Data.NPA_SE

Models:

NPA.R: NPA ~ Pole + Window + (1 | Pair/Window)

NPA.F: NPA ~ Pole * Window + (1 | Pair/Window)

	npar	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
NPA.R	7	-200.89	-181.68	107.45	-214.89			
NPA.F	8	-198.89	-176.93	107.45	-214.89	0	1	0.9967

- Deviance comparison (-2LL) between the reduced model (NPA.R) and the model that only includes time (NPA.W):

Data: Data.NPA_SE

Models:

NPA.W: NPA ~ Window + (1 | Pair/Window)

NPA.R: NPA ~ Pole + Window + (1 | Pair/Window)

	npar	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
NPA.W	6	-201.43	-184.96	106.71	-213.43			
NPA.R	7	-200.89	-181.68	107.45	-214.89	1.4649	1	0.2262

- Deviance comparison (-2LL) between the reduced model (NPA.R) and the model that only includes pole (NPA.P):

Data: Data.NPA_SE

Models:

NPA.P: NPA ~ Pole + (1 | Pair/Window)

NPA.R: NPA ~ Pole + Window + (1 | Pair/Window)

	npar	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
NPA.P	6	-201.49	-185.02	106.75	-213.49			
NPA.R	7	-200.89	-181.68	107.45	-214.89	1.402	1	0.2364

Single-Scale Sample Entropy (SampEn)

- Deviance comparison (-2LL) between the full model (includes 2-ways interactions; SampEn.F) and the reduced model (no interactions; SampEn.R):

Data: Data.NPA_SE

Models:

SampEn.R: SE ~ Pole + Window + (1 | Pair/Window)

SampEn.F: SE ~ Pole * Window + (1 | Pair/Window)

	npar	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
SampEn.R	6	-223.78	-207.37	117.89	-235.78			
SampEn.F	7	-222.74	-203.58	118.37	-236.74	0.9512	1	0.3294

- Deviance comparison (-2LL) between the reduced model (SampEn.R) and the model than only includes time (SampEn.W):

Data: Data.NPA_SE

Models:

SampEn.W: SE ~ Window + (1 | Pair/Window)

SampEn.R: SE ~ Pole + Window + (1 | Pair/Window)

	npar	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
SampEn.W	5	-220.88	-207.20	115.44	-230.88			
SampEn.R	6	-223.78	-207.37	117.89	-235.78	4.9049	1	0.02678 *

- Deviance comparison (-2LL) between the reduced model (SampEn.R) and the model than only includes pole (SampEn.P):

Data: Data.NPA_SE

Models:

SampEn.P: SE ~ Pole + (1 | Pair/Window)

SampEn.R: SE ~ Pole + Window + (1 | Pair/Window)

	npar	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
SampEn.P	5	-210.81	-197.13	110.41	-220.81			
SampEn.R	6	-223.78	-207.37	117.89	-235.78	14.973	1	0.0001091 ***

Multiscale Sample Entropy (MSE)

- Deviance comparison (-2LL) between the full model (includes 3-ways interactions; MSE.F) and the reduced model (includes 2-ways interactions; MSE.R):

Data: Data.MSE

Models:

MSE.R: SE ~ Pole * Window + Pole * Scale + Window * Scale + (1 | Pair/Window) +
 (1 | Plant/Scale)

MSE.F: SE ~ Pole * Window * Scale + (1 | Pair/Window) + (1 | Plant/Scale)

	npar	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
MSE.R	12	-1547.3	-1492.7	785.67	-1571.3			
MSE.F	13	-1551.0	-1491.8	788.50	-1577.0	5.6645	1	0.01731 *

- Deviance comparison (-2LL) between the full model for scales 2 and 2 + windows 2, 3 and 6 (includes 2-ways interactions; MSE.F.Focus) and the reduced model (no interactions; MSE.R.Focus):

Data: Focus.MSE

Models:

MSE.R.Focus: SE ~ Pole + Scale + Window + (1 | Pair/Window)

MSE.F.Focus: SE ~ Pole * Scale + Window + (1 | Pair/Window)

	npar	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
MSE.R.Focus	7	-187.75	-168.24	100.88	-201.75			
MSE.F.Focus	8	-190.11	-167.81	103.06	-206.11	4.3589	1	0.03682 *

- Follow-up analysis of variance (ANOVA) of average SampEn values between scales 2 and 3 for the no pole condition (Anova.NP):

summary(Anova.NP)

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Scale	1	0.018598	0.018598	60.69	0.00146 **
Residuals	4	0.001226	0.000306		

- Follow-up analysis of variance (ANOVA) of average SampEn values between scales 2 and 3 for the pole condition (Anova.P):

summary(Anova.P)

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Scale	1	0.00199	0.001990	1.28	0.321
Residuals	4	0.00622	0.001555		